Appln No. 10/682,632
Reply to Office Action of December 16, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A make-up control system for creating a threaded connection between a first tubular and a second tubular comprising:

a top drive connected to the first tubular such that the torque and rotational speed of said top drive is transmitted to said first tubular;

a controller operably connected to the top drive ~~that sends at least one command signal to the top drive, the top drive generating a~~ to automatically control the direction of rotation, torque and ~~a the~~ rotational speed ~~in response to the at least one command signal, the torque and rotational speed~~ being applied to the first tubular via the top drive during a make-up process between the first and second tubulars in accordance with a pre-programmed set of make-up process control instructions,

wherein the top drive generates at least torque, turn, and speed feedback signals that are transmitted to the controller, and wherein the controller monitors the feedback signals to determine the torque, number of turns, and speed of rotation that are applied to the first tubular during the make-up process, and

wherein the controller ~~limits~~ continuously controls the direction, torque and speed of rotation of the top drive in response to the feedback signals and in accordance with the pre-programmed set of make-up process control instructions during the make-up process, and halts the make-up process when one of ~~either~~ a predetermined torque, rotational speed or turn limit is reached.

2. (Original) The system of claim 1, wherein the top drive is an electric motor.

3. (Currently Amended) The system of claim 1, further comprising a motor controller operably connected between the controller and ~~to~~ the motor, wherein the

motor controller controls the rotational speed that the top drive imparts on the first tubular by controlling an amount of voltage that is applied to the top drive.

4. (Currently Amended) The system of claim 1, further comprising a motor controller operably connected between the controller and ~~to~~ the top drive, wherein the motor controller controls the torque that the top drive imparts on the first tubular by controlling an amount of current that is applied to the top drive.

5. (Original) The system of claim 1, further comprising a motor controller that controls a predetermined maximum allowable torque limit that may be applied to the first tubular.

6. (Original) The system of claim 1, further comprising a turn encoder that monitors an amount of rotation of the first tubular during the make-up process and generates a turn feedback signal and transmits the turn feedback signal to the controller.

7. (Currently Amended) A method of using a top drive in a make-up process to create a threaded connection between a first tubular and a second tubular comprising the steps of:

providing a top drive;

connecting the first tubular to the top drive;

operably connecting a controller having a pre-programmed set of make-up process control instructions to the top drive;

transmitting command signals from the controller to the top drive;

generating a rotation direction, a torque and a rotational speed in the top drive, in response to the command signals generated in accordance with the pre-programmed set of make-up process control instructions, and applying the rotation direction, the torque and rotational speed to the first tubular through the top drive during a make-up process between the first and second tubulars;

transmitting at least torque, turn, and rotational speed feedback signals from the top drive to the controller, wherein the controller uses the feedback signals to

monitor and control the torque, number of turns, and rotational speed that are applied to the first tubular during the make-up process; and

setting predetermined rotation direction, torque, turn, and rotational speed limits ~~in at least one of~~for each phase of the make-up process, such that the controller sends a command to the top drive to halt the make-up process or advance to the next phase of the make-up process when any of the predetermined limits are reached.

8. (Original) The method of claim 7, wherein the top drive is an electrical motor.

9. (Currently Amended) The method of claim 7, further comprising the step of providing a motor controller operatively connected between the controller and ~~to~~ the top drive.

10. (Original) The method of claim 7, further comprising the steps of:

controlling the rotational speed that the top drive imparts on the first tubular by controlling an amount of voltage that is applied to the top drive; and

controlling the torque that the top drive imparts on the first tubular by controlling an amount of current that is supplied to the top drive.

11. (Original) The method of claim 7, further comprising the step of obtaining torque versus turns data during the make-up process and analyzing the data to determine if the threaded connection between the first and second tubulars is a proper connection.

12. (Original) The method of claim 7, further comprising a thread matching phase, which comprises the step of aligning a threaded portion of the first tubular for threading engagement with a threaded portion of the second tubular.

13. (Original) The method of claim 12, further comprising an initial threading phase, which comprises the steps of:

setting a predetermined initial threading phase torque limit;

monitoring the amount of rotation of the first tubular; and

monitoring the torque applied to the first tubular, wherein the initial threading phase is complete when the first tubular has been rotated by a predetermined amount without exceeding the initial threading phase torque limit.

14. (Original) The method of claim 13, further comprising a main threading phase, which comprises the steps of:

increasing the speed of rotation of the first tubular; and

increasing the initial threading phase torque limit to a main threading phase torque limit.

15. (Original) The method of claim 14, wherein the main threading phase is complete when the controller detects a decrease in the speed of rotation of the first tubular coupled with the torque applied to the first tubular approaching the main threading phase torque limit.

16. (Original) The method of claim 15, further comprising a final threading phase, which comprises the steps of:

decreasing the speed of rotation applied to the first tubular below the speed of rotation set during the main threading phase; and

increasing the main threading phase torque limit to a final threading phase torque limit.

17. (Original) The method of claim 16, wherein the final threading phase is complete when the final threading phase torque limit has been reached.

18. (Original) The method of claim 17, further comprising a tightening phase, which comprises the steps of:

setting a final torque limit; and

incrementally increasing the final threading phase torque limit until the final torque limit is reached.

19. (Original) The method of claim 18, wherein the tightening phase is complete when the torque that is applied to the first tubular reaches the final torque limit and rotating ceases.

20. (Original) A method of using a top drive in a make-up process to create a threaded connection between a first tubular and a second tubular comprising the steps of:

providing a top drive;

connecting the first tubular to the top drive;

operably connecting a controller to the top drive;

transmitting command signals from the controller to the top drive;

generating a torque and a rotational speed, in response to the command signals, that are applied to the first tubular by the top drive during a make-up process between the first and second tubulars;

transmitting at least one of either a torque or turn feedback signal from the top drive to the controller, wherein the controller uses the feedback signal to monitor at least one of either the torque or number or turns that are applied to the first tubular during the make-up process;

initiating a thread matching phase, which comprises the step of aligning a threaded portion of the first tubular for threading engagement with a threaded portion of the second tubular;

initiating an initial threading phase, which comprises the steps of:

setting a predetermined initial threading phase torque limit,

monitoring the amount of rotation of the first tubular, and

monitoring the torque that is applied to the first tubular, wherein the initial threading phase is complete when the first tubular has been rotated by a predetermined amount without exceeding the initial threading phase torque limit;

initiating a main threading phase, which comprises the steps of:

increasing the speed of rotation of the first tubular, and

increasing the initial threading phase torque limit to a main threading phase torque limit, wherein the main threading phase is complete when the controller detects a decrease in the speed of rotation of the first tubular that is coupled

with the torque that applied to the first tubular being near the main threading phase torque limit;

initiating a final threading phase, which comprises the steps of:

decreasing the increased speed of rotation that is applied to the first tubular, and

increasing the main threading phase torque limit to a final threading phase torque limit, wherein the final threading phase is complete when the final threading phase torque limit has been reached; and

initiating a tightening phase, which comprises the steps of:

setting a final torque limit, and

incrementally increasing the final threading phase torque limit until the final torque limit is reached, wherein the tightening phase is complete when the torque that is applied to the first tubular reaches the final torque limit and rotation ceases, and wherein the threaded connection between the tubulars is complete when the tightening phase is complete.

21. (Original) The method of claim 20, further comprising the steps of:

obtaining torque versus turns data during the make-up process; and

analyzing the data to determine if the threaded connection is a proper connection.